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COSTS OF ALTERNATIVE HOG MANURE HANDLING SYSTEMS

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Recent legislation proposed by the Ohio legislature would require many hog farmers to file manure handling plans and change manure handling practices. This legislation, along with general heightened environmental awareness, has increased interest in alternative manure handling systems. This paper presents annual cost estimates of alternative manure systems commonly used by hog farmers. Presentation of this material has two purposes. First, these cost estimates can be used as guidelines when considering alternative manure systems. Second, annual costs for existing facilities can be compared against various "innovative" manure systems to determine the economic feasibility of the "innovative" system.

We describe the manure management facilities in the following section. Then, methods for determining costs of alternative systems are presented in the second. The results section then summarizes the cost estimates. Particular attention is given to economies of size, labor use, and full use of nutrients contained in manure.

MANURE HANDLING SYSTEMS

We examined manure systems for both hog finishing operations and for breeding operations. For finishing hogs, two types of facilities are studied: 1) paved lot, and 2) total confinement. Also, two types of housing facilities for swine breeding operations are studied: 1) partial housing, and 2) total confinement. Various manure disposal methods, storage methods, and manure application methods are examined for each facility.

Paved Lot: Finishing Operations

Three paved lot with shelter manure handling systems were examined for market hogs. These systems consisted of tractor scrape and surface spread. Alternatives for runoff control include a detention basin, settling basin, and grass infiltration area. For larger systems, wastewater irrigation may be beneficial.

Costs and returns are estimated for each of the following paved lot systems using an economic engineering approach.

1. Paved lot with shelter
    a. tractor scrape, surface spread
    b. tractor scrape, surface spread, diversion, settling basin, grass infiltration area
    c. tractor scrape, surface spread, diversion, settling basin, detention, wastewater irrigation

Total Confinement: Finishing Operations

All six confinement systems use liquid manure handling. Three of the systems use slotted floors with pit storage. The depth of the pit can be varied to allow for different storage capacity or additional outside storage can be used. The remaining systems have solid concrete floors and discharge the manure to outside storage or a lagoon by gravity through a gutter or by flushing the manure through a shallow channel. Finally, alternative spreading methods considered include surface spread, soil injection, and wastewater irrigation.

Costs and returns are estimated for each of the following six total confinement breeding systems using an economic engineering approach.

1. Slotted floor, pit storage
    a. surface spread
    b. soil incorporation by injection

2. Partially slotted floor, shallow pit discharge to lagoon with wastewater irrigation

3. Concrete floor, shallow flushing channel, lagoon, wastewater irrigation

4. Concrete floor, narrow gutter, storage

    a. surface spread
    b. soil incorporation by injection

Partial Housing: Breeding Operations

The partial housing systems examined are paved lots with farrowing houses. After the sow and pigs are removed, the lot is scraped and the manure is spread. A settling basin and grass infiltration are can be added to reduce runoff.

Costs and returns are estimated for each of the following two partial housing breeding systems using an economic engineering approach:

1. Single farrowing house on paved lot, scrape, solid spread

    a. surface spread
    b. surface spread with diversion, settling basin, grass infiltration

Total Confinement: Breeding Operation

We examined a range of manure handling systems for confined breeding system. Alternative methods for manure collection, storage, and spreading are considered. Of the five confinement systems, one assumes manure collection using tractor scraping. Four of the systems use partially slotted floors to collect the manure. Two partially slotted floor system utilize pit storage and liquid spreading. Alternatives for both surface spreading and soil injection are considered. Finally, two of the slotted floor systems use wastewater irrigation for manure disposal.

Costs and returns are estimated for each of the following five total confinement breeding systems using an economic engineering approach.

1. Solid floor, scrape, solid spread
2. Partially slotted floor, pit storage, liquid spread
   a. surface spread
   b. soil injection
3. Partially slotted floor, shallow pit, flush to lagoon, wastewater irrigation
4. Partially slotted floor, flush under slats, lagoon, wastewater irrigation

DETERMINING COSTS AND RETURNS FOR EACH SYSTEM

Yearly costs of each manure management system are estimated using an economic engineering approach. Only costs and returns directly associated with the manure handling system are included. These included labor, facility investment, and nutrients produced by the hog. Excluded are such items as potential variations in livestock performance across systems, modifications to other systems required by implementing the manure system, and impacts that alternatives may have on timeliness of crop operations.

The economic engineering approach requires two steps. First components of a system are determined. Components include 1) labor necessary to maintain the system, move manure into storage, and apply manure to fields, 2) fixed facilities, and 3) quantity of nutrients produced. Second, each component's yearly costs are determined using 1990 prices.

An example of this procedure is presented in table 1. This table shows costs and returns for a 50 hog paved lot with shelter and solid handling facility. The first column, labeled components, gives the physical make-up of the system. Most component data are obtained from White and Forster. The second

column gives the quantities required for each component. For example, 16 hours of labor are used in a year. The third column gives the new costs of investment in fixed facilities. Fixed investments only include items exclusively used in the manure system. For example, the concrete floor, box spreader, and front-end loader only relate to the manure system. On the other hand, a tractor may be used in other farm operations. Tractor's are not treated as fixed investments because such treatment would overcharge the manure system.

The column labeled annual costs gives each component's yearly costs on a per hog basis. One of two methods is used to calculate annual per hog costs, depending on whether the component is a non-capital or a capital item. Costs of non-capital items are determined by multiplying the quantity used times a 1990 price, and then dividing the result by the number of hogs. For example, the $3 annual cost results from the multiplication of 16 hours by an $8 labor cost per hour, and then dividing by 50 hogs. Prices for all non-capital items are listed in table 2.

Annual per hog costs for capital items are calculated as a percentage of capital investment. For example, the factor used for the concrete floor equalled .12. Annual costs equalled $2 per hog ($987 investment x .12 factor / 50 hogs). Factors are listed in table 3 under the column labeled "total." Total factors are the sum of costs for depreciation, repairs, interest, and insurance. Percentage for each of these columns are listed in the latter four columns. Depreciation varied across machine types depending on the estimated useful life of the machine. Depreciation factors are found by dividing 1 by the estimated useful life. Repair percentages were taken from White and Forster. The annual interest rate is assumed to equal 10 percent. The average annual interest cost is the annual interest rate times the average investment. Assuming no salvage

value, average interest cost is the interest rate (10%). Insurance costs equal one percent of the 1990 value.

The "annual returns" column (table 1) gives returns from nutrients. These are determined by multiplying the pounds of per hog production per year times the 1990 prices. Prices for the nutrients are shown in table 2. The final column lists costs and returns.

We also calculate the variable and fixed portions of total cost for each system. It is assumed that all non-capital items are variable and all capital items are fixed.

RESULTS

The net system returns for each of the systems listed above are calculate and are shown in appendix tables A-1 through A-50. The appendix tables show all the costs and returns of the systems. Therefore, they can be used when comparing alternative manure handling systems.

Tables 4 through 6 summarize the appendix tables and group them by facility type. Net system returns are calculated by subtracting the variable and fixed costs from the value of the available nutrients.

Paved Lot: Finishing Operations

Table 4 contains the net system returns for the paved lot systems. The basic system of tractor scrape and periodic spreading is the least expensive paved lot system. Net system costs are $41 per hog year for the 50 hog capacity system and are $6 for the 1,000 hog capacity.

As runoff control measures are added, the net system costs increase. With the added runoff control, the 50 hog capacity facility is at a distinct

disadvantage. The net system costs for the basic system at the 50 hog capacity are $41 per hog year. When a grass infiltration area and detention irrigation system is added, net system costs increase to $43 per hog year and $70 per hog year, respectively. Assuming that the pigs in the facility are sold 2.5 times per year, manure handling costs per pig sold are $16, $17, and $28 for the basic system, grass infiltration area, and detention irrigation system, respectively.

As system capacity increases, the difference in per hog yearly costs between the basic system and the runoff control systems decreases. At the 50 hog capacity, the net system costs for the detention irrigation system are $29 per hog year greater than net system costs for the basic system. However, at the 1,000 hog capacity, there is only a $2 per hog year difference in the net system costs for the two systems.

Total Confinement: Finishing Operations

Table 5 shows the net system returns for the total confinement market hog systems. Four total confinement systems are considered: 1) total slats with 6 month pit storage, 2) partial slats with shallow pit discharged to a lagoon, 3) solid floor with flush gutter to a lagoon, and 4) solid floor with narrow gutter discharged to a storage basin.

The net system costs for the total slat facility with surface spread are $16 per hog year. As the system capacity increases, the net system costs decrease to $8 and $6 per hog year for the 600 and 1,000 hog capacity. Incorporation of manure by injection increases the nutrients available for crop usage and reduces odor pollution. Approximately the same capital investment is necessary for the 200 and 1,000 hog capacity facilities. Therefore, at the 1,000

hog capacity, the net system cost for injection is approximately $1 per hog year less than surface spread.

The net systems costs for the partial slat and solid floor with flush to lagoon system are nearly the same. The partial slat system has a slightly higher fixed cost per hog year. The net system costs for both the partial slat and solid floor system at the 200 hog capacity is $11 per hog year. At the 1,000 hog capacity, the net system costs for the solid floor system and the partial slat system are $5 per hog year and $6 per hog year, respectively.

The solid floor with narrow gutter discharge to storage basin is the lowest cost total confinement system for the 600 and 1,000 head capacity. The net system costs for the 600 and 1,000 hog capacity are $4 per hog year and $1 per hog year, respectively.

Breeding Hogs

Table 6 shows the net system returns for the breeding hog systems. Five systems are considered: 1) paved lot with farrowing house, 2) total shelter with concrete floor, 3) total shelter with partial slats and 3 month pit storage, 4) total shelter with partial slats and shallow pit to lagoon, and 5) total shelter with flush beneath partial slats to lagoon.

The net system costs for the basic paved lot system of tractor scrape and surface spread ranges from $94 per sow year to $28 per sow year for the 20 and 100 sow capacity facilities. Like the paved lot systems for market hogs, the net system costs increase with the addition of a grass infiltration area. The system costs for the paved lot systems are generally lower than the net system costs for the total confinement systems because the paved lot systems require a lower capital investment.

When considering the total confinement systems, cost per sow year show wide variations. For example, for the 50 sow facility, costs range from $43 per sow year for the partial slats with shallow pit to lagoon system to $90 per sow year for the partial slats with pit storage and injection. Across all herd sizes, the partial slat with pit storage system has the highest manure handling costs of the breeding hog systems analyzed. The partial slat with shallow pit to lagoon system and the flush beneath partial slats to lagoon system have similar returns and variable costs. However, the flush system has higher fixed costs.

Economies of Size

Economies of size exist in all of the manure handling systems for market hogs and breeding hogs discussed above. Figure 1 illustrates economies of size for paved lot and shelter facilities for market hogs. As the number of animals increases, the net cost per hog year decreases. The majority of economies of size are captured by the 200 hog capacity. Therefore, facilities of less than 200 hog capacity are at a relative disadvantage.

Economies of size for total confinement market hog facilities are shown in figure 2. Because of high initial capital investment, confinement facilities are usually not used for systems of less than a 200 hog capacity. Above the 200 hog capacity total confinement and paved lot facilities have comparable net system costs per hog year. Therefore, different manure handling systems may be recommended for small and large farms.

Use of Available Nutrients

Sometimes farmers apply manure in excess of the nutrient requirements of the soil. Therefore, some of the nutrients available go unused. By applying

nutrients to fields at rates that do not exceed crop requirements, nutrients are fully utilized and nutrient benefits are at their maximum. For example, the net system cost for a paved lot tractor scrape and surface spread system for a 200 hog capacity facility at 50 percent usage of available nutrients is $16 per hog year. However, at 100 percent usage of available nutrients the net system cost is $13 per hog year.

SUMMARY

All the manure handling systems described in this study require a substantial investment. Therefore, serious consideration should be given to the economic results of modifying a manure handling system or choosing a new system. Modifications of an existing manure handling system can be made relatively inexpensively; however, major changes may require a large additional investment.

By using soil incorporation with the larger capacity systems that have storage, the net system cost is reduced due to a higher amount of nutrients available for use by the soil. Also, this reduces the labor cost because manure will not need to be spread as often. Techniques that maximize the amount of nutrients utilized by the soil should be considered so that benefits are not lost.

Finally, economies of size exist in manure handling systems. As the herd size increases, the net system cost per hog year decreases resulting in an advantage for larger farmers. However, other factors should be considered when choosing a manure handling system, i.e. feeding system, existing facilities. Recommendations of the best manure handling system should only be made on a individual farm basis.

REFERENCES

White, R. K., and D. L. Forster. A Manual On: Evaluation and Economic Analysis of Livestock Waste Management Systems. Environmental Protection Agency, May 1978.

TABLE 1. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, 50 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	16 hrs		3		-3
Tractor	16 hrs		4		-4
Concrete floor	12 ft2/an	987	2		-2
Box spreader/periodic use	1	4515	19		-19
Front-end loader	1	4830	18		-18
Nutrients					
N	7 lb/an yr			1	1
P2O5	12 lb/an yr			3	3
K2O	13 lb/an yr			2	2
Total		10332	47	6	-41

TABLE 2. UNIT PRICES OF VARIABLE INPUTS AND OUTPUT.

Labor	$ 8.00 per hour
Tractor	$15.00 per hour
Nitrogen	$ 0.20 per pound
Phosphate	$ 0.22 per pound
Potash	$ 0.13 per pound

TABLE 3. PERCENTAGES USED FOR CALCULATING YEARLY COSTS FOR FIXED ASSETS

Component	Component Number	Estimated Useful Life	Assumed Annual Costs (% of original investment)				
			Total	Depreciation	Repairs	Interest	Insurance
Concrete floor	1	20	0.12	0.05	0.01	0.05	0.01
Concrete lot	2	20	0.12	0.05	0.01	0.05	0.01
Concrete pit	3	20	0.12	0.05	0.01	0.05	0.01
Concrete flume (swine)	4	20	0.12	0.05	0.01	0.05	0.01
Concrete slats	5	10	0.17	0.10	0.01	0.05	0.01
Concrete settling basin	6	20	0.12	0.05	0.01	0.05	0.01
Concrete upground tanks	7	20	0.12	0.05	0.01	0.05	0.01
Concrete flume (beef)	8	20	0.12	0.05	0.01	0.05	0.01
Earthen settling basin	12	20	0.13	0.05	0.02	0.05	0.01
Earthen detention basin	12	20	0.13	0.05	0.02	0.05	0.01
Earthen storage basin	13	20	0.13	0.05	0.02	0.05	0.01
Lagoon	14	20	0.13	0.05	0.02	0.05	0.01
Diversion terrace	15	20	0.12	0.05	0.01	0.05	0.01
Grassed infiltration area	16	20	0.12	0.05	0.01	0.05	0.01
Tractor scraper	26	10	0.19	0.10	0.03	0.05	0.01
Mechanical alleyway scraper	27	7	0.25	0.14	0.05	0.05	0.01
Mechanical cage scraper	28	7	0.25	0.14	0.05	0.05	0.01
Gutter cleaner	29	10	0.21	0.10	0.05	0.05	0.01
Gutter cleaner (elevator)	30	10	0.21	0.10	0.05	0.05	0.01
Gutter cleaner (stacker)	31	10	0.21	0.10	0.05	0.05	0.01
Stacker	32	10	0.21	0.10	0.05	0.05	0.01
Tractor scraper (poultry)	33	10	0.19	0.10	0.03	0.05	0.01
Front end loader	34	10	0.19	0.10	0.03	0.05	0.01
Tractor skid loader	35	7	0.25	0.14	0.05	0.05	0.01
Cage pan scraper	36	7	0.25	0.14	0.05	0.05	0.01
Box spreader (with storage)	41	10	0.21	0.10	0.05	0.05	0.01
Vacuum tank wagon	42	7	0.25	0.14	0.05	0.05	0.01
Tank wagon	43	7	0.24	0.14	0.04	0.05	0.01
Truck box spreader	44	7	0.25	0.14	0.05	0.05	0.01
Truck tank spreader	45	7	0.24	0.14	0.04	0.05	0.01
Injector	46	7	0.25	0.14	0.05	0.05	0.01
Box spreader (daily spread)	57	5	0.31	0.20	0.05	0.05	0.01
Siphon Tank	51	10	0.19	0.10	0.03	0.05	0.01
Tipping Tank	52	7	0.25	0.14	0.05	0.05	0.01
Gated Tank	53	10	0.21	0.10	0.05	0.05	0.01
Recycle Pump	60	5	0.31	0.20	0.05	0.05	0.01
Piston Pump	61	7	0.24	0.14	0.04	0.05	0.01
Agitate/Load Pump	62	5	0.31	0.20	0.05	0.05	0.01
Irrigation System (waste)	66	7	0.25	0.14	0.05	0.05	0.01
Irrigation System (runoff)	67	10	0.20	0.10	0.04	0.05	0.01
Oxidation Ditch Rotor	71	4	0.36	0.25	0.05	0.05	0.01
Floating Aerator	72	5	0.30	0.20	0.04	0.05	0.01
Dehydrator	76	5	0.31	0.20	0.05	0.05	0.01
Pit Ventilation	81	5	0.31	0.20	0.05	0.05	0.01
Land	82		0.13		0.02	0.10	0.01

TABLE 4. MARKET HOGS, PAVED LOT WITH SHELTER, ANNUAL RETURNS AND COSTS FOR ALTERNATIVE WASTE MANAGEMENT SYSTEMS

Waste Management System (1)	System Modification (2)	Herd Size (Head Capacity) (3)	Returns to Nutrients (4)	Variable Costs (5)	Fixed Costs (6)	Net System Returns (4)-(5)-(6)	Appendix Reference
			(Dollars per Hog Year)				
Paved lot with shelter	Base	50	6	7	40	-41	A-1
	Runoff control-detention/ irrigation	50	6	8	67	-70	A-2
	Runoff control-grass infiltration	50	6	7	42	-43	A-3
	Base	200	6	7	12	-13	A-4
	Runoff control-detention/ irrigation	200	6	7	19	-20	A-5
	Runoff control-grass infiltration	200	6	7	12	-14	A-6
	Base	600	6	7	6	-7	A-7
	Runoff control-detention/ irrigation	600	6	7	8	-10	A-8
	Runoff control-grass infiltration	600	6	7	6	-8	A-9
	Base	1000	6	7	5	-6	A-10
	Runoff control-detention/ irrigation	1000	6	7	7	-8	A-11
	Runoff control-grass infiltration	1000	6	7	5	-7	A-12

TABLE 5. MARKET HOGS, TOTAL SHELTER, ANNUAL RETURNS AND COSTS FOR ALTERNATIVE WASTE MANAGEMENT SYSTEMS

Waste Management System (1)	System Modification (2)	Herd Size (Head Capacity) (3)	Returns to Nutrients (4)	Variable Costs (5)	Fixed Costs (6)	Net System Returns (4)-(5)-(6)	Appendix Reference
			(Dollars per Hog Year)				
Total slats, 6 month pit storage	Surface Spread	200	7	5	18	-16	A-13
	Injection	200	8	5	22	-19	A-14
	Surface Spread	600	7	3	12	-8	A-15
	Injection	600	8	3	13	-8	A-16
	Surface Spread	1000	7	3	10	-6	A-17
	Injection	1000	8	3	10	-5	A-18
Partial slats, shallow pit discharge to lagoon	Base	200	4	2	13	-11	A-19
	Base	600	4	1	9	-7	A-20
	Base	1000	4	1	8	-6	A-21
Solid floor, flush gutter to lagoon	Base	200	4	2	13	-11	A-22
	Base	600	4	1	8	-6	A-23
	Base	1000	4	1	7	-5	A-24
Solid floor, narrow gutter discharge to storage basin	Surface Spread	200	7	6	14	-13	A-25
	Injection	200	8	6	17	-15	A-26
	Surface Spread	600	7	3	7	-4	A-27
	Injection	600	8	4	9	-4	A-28
	Surface Spread	1000	7	3	5	-1	A-29
	Injection	1000	8	3	6	-1	A-30

TABLE 6. BREEDING HOGS, ANNUAL RETURNS AND COSTS FOR ALTERNATIVE WASTE MANAGEMENT SYSTEMS

Waste Management System (1)	System Modification (2)	Herd Size (Head Capacity) (3)	Returns to Nutrients (4)	Variable Costs (5)	Fixed Costs (6)	Net System Returns (4)-(5)-(6)	Appendix Reference
			(Dollars per Sow Year)				
Paved lot with farrowing house	Base	20	3	19	78	-94	A-31
	Runoff control-grass infiltration	20	3	19	84	-100	A-32
	Base	50	3	11	36	-45	A-33
	Runoff control-grass infiltration	50	3	11	39	-48	A-34
	Base	100	3	9	22	-28	A-35
	Runoff control-grass infiltration	100	3	9	24	-30	A-36
Total shelter, concrete floor	Base	20	4	38	76	-110	A-37
	Base	50	4	23	34	-53	A-38
Total shelter, partial slats, 3 month pit storage	Surface Spread	20	3	11	139	-147	A-39
	Injection	20	4	13	176	-185	A-40
	Surface Spread	50	3	10	69	-75	A-41
	Injection	50	4	11	84	-90	A-42
	Surface Spread	100	3	10	45	-52	A-43
	Injection	100	4	10	53	-59	A-44
Total shelter, partial slats, shallow pit with lagoon	Base	20	1	2	84	-84	A-45
	Base	50	1	1	44	-43	A-46
	Base	100	1	1	31	-30	A-47
Total shelter, flush beneath partial slats to lagoon	Base	20	1	2	101	-101	A-48
	Base	50	1	1	52	-51	A-49
	Base	100	1	1	36	-35	A-50

Figure 1. Yearly Net System Costs for Manure Handling Systems for Market Hogs on Paved Lots with Shelter and Surface Manure Spreading

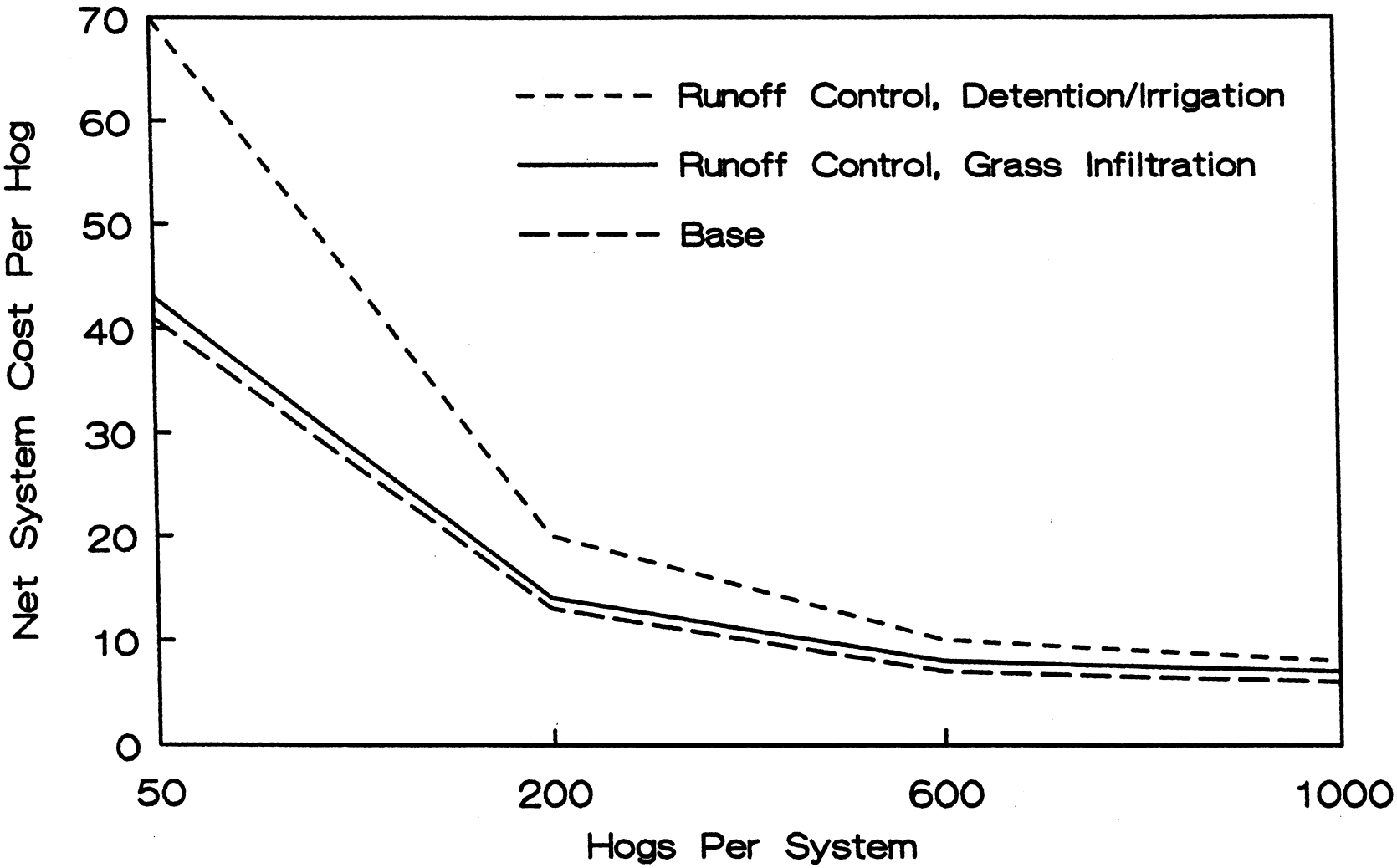

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Figure 2. Yearly Net System Costs of Manure Handling Systems for Market Hogs in Total Confinement Housing

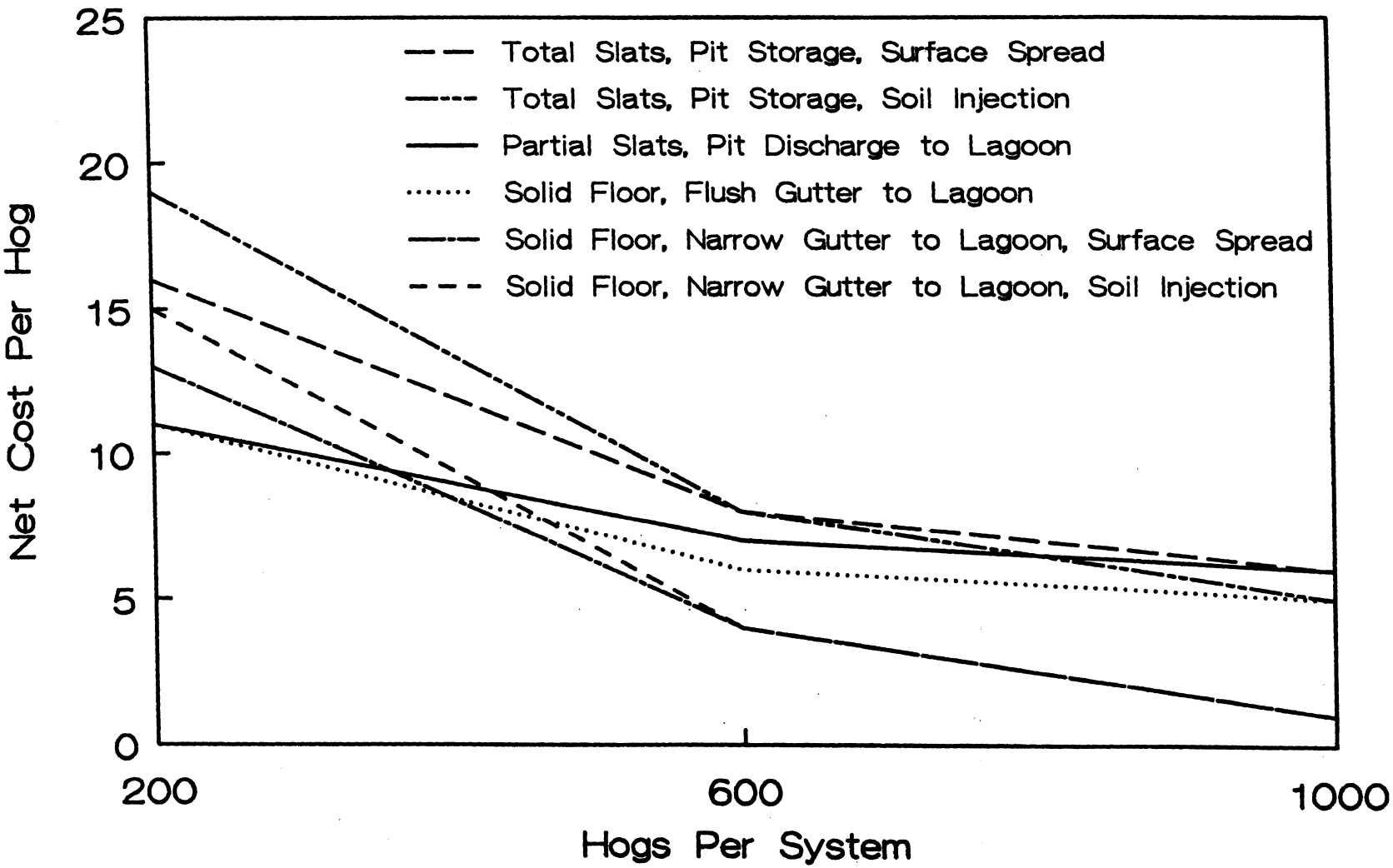

TABLE A-1. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, 50 ANIMAL UNITS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	16 hrs		3		-3
Tractor	16 hrs		4		-4
Concrete floor	12 ft2/an	987	2		-2
Box spreader/periodic use	1	4515	19		-19
Front-end loader	1	4830	18		-18
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		10332	47	6	-41

TABLE A-2. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, DETENTION/IRRIGATION, 50 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	18 hrs		3		-3
Tractor	19 hrs		5		-5
Concrete floor	12 ft2/an	987	2		-2
Box spreader/periodic use	1	4515	19		-19
Front-end loader	1	4830	18		-18
Settling basin/earthen	90 ft2	439	1		-1
Detention basin/earthen	300 ft2	186	0		0
Wastewater irrigation/RO	1	5124	26		-26
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		16081	75	6	-70

TABLE A-3. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, GRASS INFILTRATION, 50 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	18 hrs		3		-3
Tractor	16 hrs		4		-4
Concrete floor	12 ft2/an	987	2		-2
Box spreader/periodic use	1	4515	19		-19
Front-end loader	1	4830	18		-18
Settling basin/concrete	90 ft2	439	1		-1
Infiltration area	12x13 ft	412	1		-1
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		11183	49	6	-43

TABLE A-4. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	64 hrs		3		-3
Tractor	64 hrs		4		-4
Concrete floor	12 ft2/an	3947	2		-2
Box spreader/periodic use	1	4515	5		-5
Front-end loader	1	4830	5		-5
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		13292	19	6	-13

TABLE A-5. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, DETENTION/IRRIGATION, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	67 hrs		3		-3
Tractor	70 hrs		5		-5
Concrete floor	12 ft2/an	3947	2		-2
Box spreader/periodic use	1	4515	5		-5
Front-end loader	1	4830	5		-5
Settling basin/earthen	140 ft2	658	0		0
Detention basin/earthen	1200 ft2	243	0		0
Wastewater irrigation/RO	1	5040	6		-6
Nutrients					
N	7 lb/an yr			1	1
P2O5	12 lb/an yr			3	3
K2O	13 lb/an yr			2	2
Total		19233	26	6	-20

TABLE A-6. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, GRASS INFILTRATION, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	67 hrs		3		-3
Tractor	70 hrs		4		-4
Concrete floor	12 ft2/an	3861	2		-2
Box spreader/periodic use	1	4515	5		-5
Front-end loader	1	4830	5		-5
Settling basin/concrete	140 ft2	658	0		0
Infiltration area	12x135 ft	480	0		0
Nutrients					
N	7 lb/an yr			1	1
P2O5	12 lb/an yr			3	3
K2O	13 lb/an yr			2	2
Total		14344	19	6	-14

TABLE A-7. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	192 hrs		3		-3
Tractor	192 hrs		4		-4
Concrete floor	12 ft2/an	11840	2		-2
Box spreader/periodic use	1	5460	2		-2
Front-end loader	1	5670	2		-2
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		22970	13	6	-7

TABLE A-8. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, DETENTION/IRRIGATION, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	196 hrs		3		-3
Tractor	199 hrs		5		-5
Concrete floor	12 ft2/an	11840	2		-2
Box spreader/periodic use	1	5460	2		-2
Front-end loader	1	5670	2		-2
Settling basin/earthen	170 ft2	812	0		0
Detention basin/earthen	3600 ft2	360	0		0
Wastewater irrigation/RO	1	5124	2		-2
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		29267	16	6	-10

TABLE A-9. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, GRASS INFILTRATION, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	199 hrs		3		-3
Tractor	192 hrs		4		-4
Concrete floor	12 ft2/an	11840	2		-2
Box spreader/periodic use	1	5460	2		-2
Front-end loader	1	5670	2		-2
Settling basin/concrete	170 ft2	812	0		0
Infiltration area	12x600 ft	824	0		0
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		24606	13	6	-8

TABLE A-10. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	320 hrs		3		-3
Tractor	320 hrs		4		-4
Concrete floor	12 ft2/an	19734	2		-2
Box spreader/periodic use	1	7980	2		-2
Front-end loader	1	6090	1		-1
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		33804	12	6	-6

TABLE A-11. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, DETENTION/IRRIGATION, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	325 hrs		3		-3
Tractor	328 hrs		4		-4
Concrete floor	12 ft2/an	19734	2		-2
Box spreader/periodic use	1	7980	2		-2
Front-end loader	1	6090	1		-1
Settling basin/earthen	300 ft2	1291	0		0
Detention basin/earthen	6000 ft2	701	0		0
Wastewater irrigation/RO	1	5124	1		-1
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		40920	14	6	-8

TABLE A-12. ECONOMIC DATA FOR MARKET HOGS, PAVED LOT WITH SHELTER, SOLID HANDLING, GRASS INFILTRATION, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	329 hrs		3		-3
Tractor	320 hrs		4		-4
Concrete floor	12 ft2/an	19734	2		-2
Box spreader/periodic use	1	7980	2		-2
Front-end loader	1	6090	1		-1
Settling basin/concrete	300 ft2	1291	0		0
Infiltration area	12x700 ft	961	0		0
Nutrients					
N	7 lb/an yr			1	1
P205	12 lb/an yr			3	3
K20	13 lb/an yr			2	2
Total		36056	13	6	-7

TABLE A-13. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, TOTAL SLATS, PIT STORAGE (6 MO), LIQUID HANDLING, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	30 hrs		1		-1
Tractor	30 hrs		4		-4
Concrete slats	7 ft2/an	4404	4		-4
Concrete pit	56 ft3/an	4805	3		-3
tank wagon	1	9240	11		-11
Nutrients					
N	8 lb/an yr			2	2
P205	15 lb/an yr			3	3
K20	16 lb/an yr			2	2
Total		18449	23	7	-16

TABLE A-14. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, TOTAL SLATS, PIT STORAGE (6 MO), LIQUID HANDLING, INJECTION, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	35 hrs		1		-1
Tractor	35 hrs		4		-4
Concrete slats	7 ft2/an	4404	4		-4
Concrete pit	56 ft3/an	4805	3		-3
tank wagon	1	9240	11		-11
Injector/soil incorporation	1	2940	4		-4
Nutrients					
N	11 lb/an yr			2	2
P205	17 lb/an yr			4	4
K20	18 lb/an yr			2	2
Total		21389	27	8	-19

TABLE A-15. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, TOTAL SLATS, PIT STORAGE (6 MO), LIQUID HANDLING, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	55 hrs		1		-1
Tractor	55 hrs		2		-2
Concrete slats	7 ft2/an	13213	4		-4
Concrete pit	56 ft3/an	15444	3		-3
tank wagon	1	12600	5		-5
Nutrients					
N	8 lb/an yr			2	2
P2O5	15 lb/an yr			3	3
K2O	16 lb/an yr			2	2
Total		41257	15	7	-8

TABLE A-16. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, TOTAL SLATS, PIT STORAGE (6 MO), LIQUID HANDLING, INJECTION, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	58 hrs		1		-1
Tractor	58 hrs		2		-2
Concrete slats	7 ft2/an	13213	4		-4
Concrete pit	56 ft3/an	15444	3		-3
tank wagon	1	12600	5		-5
Injector/soil incorporation	1	2940	1		-1
Nutrients					
N	11 lb/an yr			2	2
P2O5	17 lb/an yr			4	4
K2O	18 lb/an yr			2	2
Total		44197	16	8	-8

TABLE A-17. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, TOTAL SLATS, PIT STORAGE (6 MO), LIQUID HANDLING, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	90 hrs		1		-1
Tractor	90 hrs		2		-2
Concrete slats	7 ft2/an	22022	4		-4
Concrete pit	56 ft3/an	24024	3		-3
tank wagon	1	12600	3		-3
Nutrients					
N	8 lb/an yr			2	2
P205	15 lb/an yr			3	3
K20	16 lb/an yr			2	2
Total		58646	13	7	-6

TABLE A-18. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, TOTAL SLATS, PIT STORAGE (6 MO), LIQUID HANDLING, INJECTION, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	92 hrs		1		-1
Tractor	92 hrs		2		-2
Concrete slats	7 ft2/an	22022	4		-4
Concrete pit	56 ft3/an	24024	3		-3
tank wagon	1	12600	3		-3
Injector/soil incorporation	1	2940	1		-1
Nutrients					
N	11 lb/an yr			2	2
P205	17 lb/an yr			4	4
K20	18 lb/an yr			2	2
Total		61586	13	8	-5

TABLE A-19. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, PARTIAL SLATS, SHALLOW PIT DISCHARGE TO LAGOON, WASTEWATER DISPOSAL, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	22 hrs		1		-1
Tractor	14 hrs		1		-1
Concrete slats	3 ft2/an	1544	1		-1
Concrete pit	12 ft3/an	1030	1		-1
Concrete floor	4 ft2/an	1888	1		-1
Lagoon	54000 ft3	4862	3		-3
Wastewater irrigation/manure	1	5124	6		-6
Nutrients					
N	2 lb/an yr			0	0
P2O5	8 lb/an yr			2	2
K2O	11 lb/an yr			1	1
Total		14448	14	4	-11

TABLE A-20. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, PARTIAL SLATS, SHALLOW PIT DISCHARGE TO LAGOON, WASTEWATER DISPOSAL, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	38 hrs		1		-1
Tractor	42 hrs		1		-1
Concrete slats	3 ft2/an	4633	1		-1
Concrete pit	12 ft3/an	3089	1		-1
Concrete floor	4 ft2/an	5663	1		-1
Lagoon	162000 ft3	14300	3		-3
Wastewater irrigation/manure	1	6069	3		-3
Nutrients					
N	2 lb/an yr			0	0
P2O5	8 lb/an yr			2	2
K2O	11 lb/an yr			1	1
Total		33754	10	4	-7

TABLE A-21. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, PARTIAL SLATS, SHALLOW PIT DISCHARGE TO LAGOON, WASTEWATER DISPOSAL, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	52 hrs		0		0
Tractor	70 hrs		1		-1
Concrete slats	3 ft2/an	7722	1		-1
Concrete pit	12 ft3/an	5148	1		-1
Concrete floor	4 ft2/an	9438	1		-1
Lagoon	270000 ft3	24024	3		-3
Wastewater irrigation/manure	1	6909	2		-2
Nutrients					
N	2 lb/an yr			0	0
P2O5	8 lb/an yr			2	2
K2O	11 lb/an yr			1	1
Total		53241	9	4	-6

TABLE A-22. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, FLUSH GUTTER TO LAGOON, WASTEWATER DISPOSAL, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	18 hrs		1		-1
Tractor	14 hrs		1		-1
Concrete floor	8 ft2/an	3095	2		-2
Siphon tank	1	630	1		-1
Recycle pump/pipe	1	893	1		-1
Lagoon	54000 ft3	4576	3		-3
Wastewater irrigation/manure	1	5124	6		-6
Nutrients					
N	2 lb/an yr			0	0
P2O5	8 lb/an yr			2	2
K2O	11 lb/an yr			1	1
Total		14317	15	4	-11

TABLE A-23. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, FLUSH GUTTER TO LAGOON, WASTEWATER DISPOSAL, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	26 hrs		0		0
Tractor	42 hrs		1		-1
Concrete floor	8 ft2/an	9284	2		-2
Siphon tank	2	1050	0		0
Recycle pump/pipe	1	998	1		-1
Lagoon	162000 ft3	13728	3		-3
Wastewater irrigation/manure	1	6069	3		-3
Nutrients					
N	2 lb/an yr			0	0
P205	8 lb/an yr			2	2
K20	11 lb/an yr			1	1
Total		31128	9	4	-6

TABLE A-24. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, FLUSH GUTTER TO LAGOON, WASTEWATER DISPOSAL, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	34 hrs		0		0
Tractor	70 hrs		1		-1
Concrete floor	8 ft2/an	15473	2		-2
Siphon tank	4	1680	0		0
Recycle pump/pipe	1	1103	0		0
Lagoon	270000 ft3	22880	3		-3
Wastewater irrigation/manure	1	6909	2		-2
Nutrients					
N	2 lb/an yr			0	0
P205	8 lb/an yr			2	2
K20	11 lb/an yr			1	1
Total		48044	8	4	-5

TABLE A-25. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, NARROW GUTTER DISCHARGE TO STORAGE BASIN, LIQUID HANDLING, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	55 hrs		2		-2
Tractor	30 hrs		4		-4
Concrete floor	7 ft2/an	3012	2		-2
Tank wagon	1	9240	11		-11
Storage basin	56 ft3/an	1050	1		-1
Nutrients					
N	8 lb/an yr			2	2
P205	15 lb/an yr			3	3
K20	16 lb/an yr			2	2
Total		13301	20	7	-13

TABLE A-26. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, NARROW GUTTER DISCHARGE TO STORAGE BASIN, LIQUID HANDLING, INJECTION, 200 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	58 hrs		2		-2
Tractor	33 hrs		4		-4
Concrete floor	7 ft2/an	3012	2		-2
Tank wagon	1	9240	11		-11
Storage basin	56 ft3/an	1050	1		-1
Injector/soil incorporation	1	2940	4		-4
Nutrients					
N	11 lb/an yr			2	2
P205	17 lb/an yr			4	4
K20	18 lb/an yr			2	2
Total		16241	24	8	-15

TABLE A-27. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, NARROW GUTTER DISCHARGE TO STORAGE BASIN, LIQUID HANDLING, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	80 hrs		1		-1
Tractor	55 hrs		2		-2
Concrete floor	7 ft2/an	9035	2		-2
Tank wagon	1	12600	5		-5
Storage basin	56 ft3/an	1716	0		0
Nutrients					
N	8 lb/an yr			2	2
P205	15 lb/an yr			3	3
K20	16 lb/an yr			2	2
Total		23351	11	7	-4

TABLE A-28. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, NARROW GUTTER DISCHARGE TO STORAGE BASIN, LIQUID HANDLING, INJECTION, 600 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	86 hrs		1		-1
Tractor	61 hrs		2		-2
Concrete floor	7 ft2/an	9035	2		-2
Tank wagon	1	12600	5		-5
Storage basin	56 ft3/an	1716	0		0
Injector/soil incorporation	1	2940	1		-1
Nutrients					
N	11 lb/an yr			2	2
P205	17 lb/an yr			4	4
K20	18 lb/an yr			2	2
Total		26291	12	8	-4

TABLE A-29. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, NARROW GUTTER DISCHARGE TO STORAGE BASIN, LIQUID HANDLING, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	115 hrs		1		-1
Tractor	90 hrs		2		-2
Concrete floor	7 ft2/an	15058	2		-2
Tank wagon	1	12600	3		-3
Storage basin	56 ft3/an	2388	0		0
Nutrients					
N	8 lb/an yr			2	2
P205	15 lb/an yr			3	3
K20	16 lb/an yr			2	2
Total		30046	8	7	-1

TABLE A-30. ECONOMIC DATA FOR MARKET HOGS, TOTAL SHELTER, NARROW GUTTER DISCHARGE TO STORAGE BASIN, LIQUID HANDLING, INJECTION, 1000 HOGS

Component	Quantity	Capital Investment ($)	Annual Cost ($/hog yr)	Annual Returns ($/hog yr)	Annual Net System Return ($/hog yr)
Labor	121 hrs		1		-1
Tractor	96 hrs		2		-2
Concrete floor	7 ft2/an	15058	2		-2
Tank wagon	1	12600	3		-3
Storage basin	56 ft3/an	2388	0		0
Injector/soil incorporation	1	2940	1		-1
Nutrients					
N	11 lb/an yr			2	2
P205	17 lb/an yr			4	4
K20	18 lb/an yr			2	2
Total		32986	9	8	-1

TABLE A-31. ECONOMIC DATA FOR BREEDING HOGS, PAVED LOT, FARROWING HOUSE, SOLID HANDLING, 20 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	26 hrs		10		-10
Tractor	10 hrs		8		-8
Concrete floor	100 ft2/an	1359	8		-8
Box spreader/daily use	1	4515	70		-70
Nutrients					
N	6 lb/an yr			1	1
P205	3 lb/an yr			1	1
K20	7 lb/an yr			1	1
Total		5874	97	3	-94

TABLE A-32. ECONOMIC DATA FOR BREEDING HOGS, PAVED LOT, FARROWING HOUSE, SOLID HANDLING, GRASS INFILTRATION, 20 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	26 hrs		10		-10
Tractor	10 hrs		8		-8
Concrete floor	100 ft2/an	1359	8		-8
Box spreader/daily use	1	4515	70		-70
Settling basin/concrete	180 ft2	656	4		-4
Infiltration area	12x150 ft	206	1		-1
Nutrients					
N	6 lb/an yr			1	1
P205	3 lb/an yr			1	1
K20	7 lb/an yr			1	1
Total		6736	102	3	-100

TABLE A-33. ECONOMIC DATA FOR BREEDING HOGS, PAVED LOT, FARROWING HOUSE, SOLID HANDLING, 50 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	50 hrs		8		-8
Tractor	10 hrs		3		-3
Concrete floor	100 ft2/an	3396	8		-8
Box spreader/daily use	1	4515	28		-28
Nutrients					
N	6 lb/an yr			1	1
P2O5	3 lb/an yr			1	1
K2O	7 lb/an yr			1	1
Total		7911	48	3	-45

TABLE A-34. ECONOMIC DATA FOR BREEDING HOGS, PAVED LOT, FARROWING HOUSE, SOLID HANDLING, GRASS INFILTRATION, 50 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	50 hrs		8		-8
Tractor	10 hrs		3		-3
Concrete floor	100 ft2/an	3396	8		-8
Box spreader/daily use	1	4515	28		-28
Settling basin/concrete	230 ft2	845	2		-2
Infiltration area	12x225 ft	309	1		-1
Nutrients					
N	6 lb/an yr			1	1
P2O5	3 lb/an yr			1	1
K2O	7 lb/an yr			1	1
Total		9065	50	3	-48

TABLE A-35. ECONOMIC DATA FOR BREEDING HOGS, PAVED LOT, FARROWING HOUSE SOLID HANDLING, 100 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	90 hrs		7		-7
Tractor	10 hrs		2		-2
Concrete floor	100 ft2/an	6793	8		-8
Box spreader/daily use	1	4515	14		-14
Nutrients					
N	6 lb/an yr			1	1
P205	3 lb/an yr			1	1
K20	7 lb/an yr			1	1
Total		11308	31	3	-28

TABLE A-36. ECONOMIC DATA FOR BREEDING HOGS, PAVED LOT, FARROWING HOUSE, SOLID HANDLING, GRASS INFILTRATION, 100 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	90 hrs		7		-7
Tractor	10 hrs		2		-2
Concrete floor	100 ft2/an	6793	8		-8
Box spreader/daily use	1	4515	14		-14
Settling basin/concrete	250 ft2	955	1		-1
Infiltration area	12x300 ft	412	0		0
Nutrients					
N	6 lb/an yr			1	1
P205	3 lb/an yr			1	1
K20	7 lb/an yr			1	1
Total		12675	33	3	-30

TABLE A-37. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, CONCRETE FLOOR, SOLID HANDLING, 20 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	52 hrs		21		-21
Tractor	20 hrs		17		-17
Concrete floor	35 ft2/an	965	6		-6
Box spreader/daily use	1	4515	70		-70
Nutrients					
N	8 lb/an yr			2	2
P205	4 lb/an yr			1	1
K20	8 lb/an yr			1	1
Total		5480	113	4	-110

TABLE A-38. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, CONCRETE FLOOR, SOLID HANDLING, 50 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	100 hrs		16		-16
Tractor	20 hrs		7		-7
Concrete floor	35 ft2/an	2414	6		-6
Box spreader/daily use	1	4515	28		-28
Nutrients					
N	8 lb/an yr			2	2
P205	4 lb/an yr			1	1
K20	8 lb/an yr			1	1
Total		6929	57	4	-53

TABLE A-39. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, PIT STORAGE (3 MO), LIQUID HANDLING, 20 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	22 hrs		9		-9
Tractor	2 hrs		2		-2
Concrete floor	40 ft2/an	1544	9		-9
Concrete slats	20 ft2/an	1258	11		-11
Concrete pit	40 ft3/an	329	2		-2
Vacuum tank wagon	1	9240	117		-117
Nutrients					
N	7 lb/an yr			1	1
P2O5	4 lb/an yr			1	1
K2O	8 lb/an yr			1	1
Total		12372	150	3	-147

TABLE A-40. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, PIT STORAGE (3 MO), LIQUID HANDLING, INJECTION, 20 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	23 hrs		9		-9
Tractor	3 hrs		4		-4
Concrete floor	40 ft2/an	1544	9		-9
Concrete slats	20 ft2/an	1258	11		-11
Concrete pit	40 ft3/an	329	2		-2
Vacuum tank wagon	1	9240	117		-117
Injector/soil incorporation	1	2940	37		-37
Nutrients					
N	9 lb/an yr			2	2
P2O5	5 lb/an yr			1	1
K2O	9 lb/an yr			1	1
Total		15312	189	4	-185

TABLE A-41. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, PIT STORAGE (3 MO), LIQUID HANDLING, 50 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	53 hrs		8		-8
Tractor	3 hrs		1		-1
Concrete floor	40 ft2/an	3861	9		-9
Concrete slats	20 ft2/an	3146	11		-11
Concrete pit	40 ft3/an	822	2		-2
Vacuum tank wagon	1	9240	47		-47
Nutrients					
N	7 lb/an yr			1	1
P2O5	4 lb/an yr			1	1
K2O	8 lb/an yr			1	1
Total		17069	79	3	-75

TABLE A-42. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, PIT STORAGE (3 MO), LIQUID HANDLING, INJECTION, 50 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	54 hrs		9		-9
Tractor	4 hrs		2		-2
Concrete floor	40 ft2/an	3861	9		-9
Concrete slats	20 ft2/an	3146	11		-11
Concrete pit	40 ft3/an	822	2		-2
Vacuum tank wagon	1	9240	47		-47
Injector/soil incorporation	1	2940	15		-15
Nutrients					
N	9 lb/an yr			2	2
P2O5	5 lb/an yr			1	1
K2O	9 lb/an yr			1	1
Total		20009	94	4	-90

TABLE A-43. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, PIT STORAGE (3 MO), LIQUID HANDLING, 100 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	105 hrs		8		-8
Tractor	5 hrs		1		-1
Concrete floor	40 ft2/an	7722	9		-9
Concrete slats	20 ft2/an	6292	11		-11
Concrete pit	40 ft3/an	1645	2		-2
Vacuum tank wagon	1	9240	23		-23
Nutrients					
N	7 lb/an yr			1	1
P205	4 lb/an yr			1	1
K20	8 lb/an yr			1	1
Total		24899	55	3	-52

TABLE A-44. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, PIT STORAGE (3 MO), LIQUID HANDLING, INJECTION, 100 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	106 hrs		8		-8
Tractor	6 hrs		1		-1
Concrete floor	40 ft2/an	7722	9		-9
Concrete slats	20 ft2/an	6292	11		-11
Concrete pit	40 ft3/an	1645	2		-2
Vacuum tank wagon	1	9240	23		-23
Injector/soil incorporation	1	2940	7		-7
Nutrients					
N	9 lb/an yr			2	2
P205	5 lb/an yr			1	1
K20	9 lb/an yr			1	1
Total		27839	63	4	-59

TABLE A-45. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, SHALLOW PIT, LAGOON, WASTEWATER IRRIGATION, 20 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	2 hrs		1		-1
Tractor	2 hrs		1		-1
Concrete slats	18 ft2/an	1101	9		-9
Concrete pit	13 ft3/an	114	1		-1
Concrete floor	18 ft2/an	676	4		-4
Lagoon	3800 ft3	715	5		-5
Wastewater irrigation/manure	1	5124	65		-65
Nutrients					
N	2 lb/an yr			0	0
P205	2 lb/an yr			0	0
K20	5 lb/an yr			1	1
Total		7731	86	1	-84

TABLE A-46. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, SHALLOW PIT, LAGOON, WASTEWATER IRRIGATION, 50 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	2 hrs		0		0
Tractor	2 hrs		0		0
Concrete slats	18 ft2/an	2753	9		-9
Concrete pit	13 ft3/an	279	1		-1
Concrete floor	18 ft2/an	1689	4		-4
Lagoon	9400 ft3	1573	4		-4
Wastewater irrigation/manure	1	5124	26		-26
Nutrients					
N	2 lb/an yr			0	0
P205	2 lb/an yr			0	0
K20	5 lb/an yr			1	1
Total		11417	45	1	-43

TABLE A-47. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, SHALLOW PIT, LAGOON, WASTEWATER IRRIGATION, 100 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	3 hrs		0		0
Tractor	3 hrs		0		0
Concrete slats	18 ft2/an	5506	9		-9
Concrete pit	13 ft3/an	558	1		-1
Concrete floor	18 ft2/an	3379	4		-4
Lagoon	19000 ft3	2860	4		-4
Wastewater irrigation/manure	1	5124	13		-13
Nutrients					
N	2 lb/an yr			0	0
P205	2 lb/an yr			0	0
K20	5 lb/an yr			1	1
Total		17426	31	1	-30

TABLE A-48. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, FLUSH, LAGOON, WASTEWATER IRRIGATION, 20 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	2 hrs		1		-1
Tractor	2 hrs		1		-1
Concrete floor	18 ft2/an	676	4		-4
Concrete slats	18 ft2/an	1101	9		-9
Siphon tank	1	210	2		-2
Concrete pit	13 ft3/an	114	1		-1
Lagoon	3000 ft3	549	4		-4
Recycle pump/pipe	1	1050	16		-16
Wastewater irrigation/manure	1	5124	65		-65
Nutrients					
N	2 lb/an yr			0	0
P205	2 lb/an yr			0	0
K20	5 lb/an yr			1	1
Total		8825	103	1	-101

TABLE A-49. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, FLUSH, LAGOON, WASTEWATER IRRIGATION, 50 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	2 hrs		0		0
Tractor	2 hrs		0		0
Concrete floor	18 ft2/an	1689	4		-4
Concrete slats	18 ft2/an	2753	9		-9
Siphon tank	1	210	1		-1
Concrete pit	13 ft3/an	279	1		-1
Lagoon	7900 ft3	1313	3		-3
Recycle pump/pipe	1	1260	8		-8
Wastewater irrigation/manure	1	5124	26		-26
Nutrients					
N	2 lb/an yr			0	0
P2O5	2 lb/an yr			0	0
K2O	5 lb/an yr			1	1
Total		12627	53	1	-51

TABLE A-50. ECONOMIC DATA FOR BREEDING HOGS, TOTAL SHELTER, PARTIAL SLATS, FLUSH, LAGOON, WASTEWATER IRRIGATION, 100 SOWS

Component	Quantity	Capital Investment ($)	Annual Cost ($/sow yr)	Annual Returns ($/sow yr)	Annual Net System Return ($/sow yr)
Labor	3 hrs		0		0
Tractor	3 hrs		0		0
Concrete floor	18 ft2/an	3379	4		-4
Concrete slats	18 ft2/an	5506	9		-9
Siphon tank	2	315	1		-1
Concrete pit	13 ft3/an	558	1		-1
Lagoon	17000 ft3	2554	3		-3
Recycle pump/pipe	1	1575	5		-5
Wastewater irrigation/manure	1	5124	13		-13
Nutrients					
N	2 lb/an yr			0	0
P2O5	2 lb/an yr			0	0
K2O	5 lb/an yr			1	1
Total		19010	36	1	-35